

MODUL PINTAS 2024
TINGKATAN 5

4541/2

KIMIA
Kertas 2

$2\frac{1}{2}$ jam

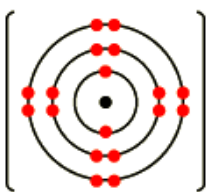
Dua jam tiga puluh minit

PERATURAN PEMARKAHAN
KIMIA K2
4541/2

Bahagian A
Section A

Soalan Question			Jawapan Answer	Markah Marks
1	(a)		Ubat W : Antimikrob / <i>Antimicrobials</i> Ubat X : Analgesik / <i>Analgesics</i>	1 1
	(b)		Membunuh atau merencatkan pertumbuhan bakteria <i>Kill or retard bacterial growth</i>	1
	(c)		Haloperidol / Klorpromazin / Klozapin <i>Haloperidol/Chlorpromazine/Clozapine</i> (mana-mana satu jawapan)	1
	(d)		Melegakan kesakitan (dalam keadaan sedar) <i>Relieve pain (in conscious state)</i>	1
			Jumlah <i>Total</i>	5

Soalan Question			Jawapan Answer	Markah Marks																																																							
2	(a)		Gas adi <i>Noble gases</i>	1																																																							
	(b)	i	P1 : Unsur A <i>Element A</i>	1																																																							
			P2 : <u>Atom</u> telah mencapai susunan elektron duplet yang stabil <i>The <u>atom</u> has achieved <u>stable duplet electron arrangement</u></i> P3 : <u>Atom</u> tidak boleh <u>menderma, menerima atau berkongsi elektron</u> <i>The <u>atom</u> cannot <u>donate, receive/gain or share electrons</u></i> <i>*Reject: element / unsur</i>	2																																																							
			ii	<table><tr><td>1</td><td>2</td><td></td><td></td><td></td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td></tr><tr><td>B</td><td></td><td></td><td></td><td></td><td>E</td><td></td><td></td><td>C</td><td></td><td>A</td></tr><tr><td>D</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>F</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>	1	2				13	14	15	16	17	18	B					E			C		A	D									F																							
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Soalan Question			Jawapan Answer	Markah Marks
3	(a)		Proton// Neutron	1
	(b)		P dan/ and Q	1
	(c)		2	1
	(d)	(i)	 *Correct electron arrangement *Nucleus labelled and correct charge	1 1
		(ii)	Jisim atom relatif = $\frac{(75.8 \times 35) + (37 \times 24.2)}{100}$ <i>Relatif atomic mass</i> = 35.48 *2 decimal points	1
			Jumlah Total	6

Soalan Question			Jawapan Answer	Markah Marks
4	(a)	(i)	2.8.2	1
		(ii)	Daya tarikan elektrostatik <i>Electrostatic attraction forces // Electrostatic forces of attraction</i>	1
		(iii)	$2X + Y_2 \rightarrow 2XY$ // $2Mg + O_2 \rightarrow 2MgO$	2
		(iv)	Takat lebur dan didih yang tinggi // Larut di dalam air dan tidak larut di dalam pelarut organik // Boleh menghkonduksi elektrik dalam keadaan leburan dan larutan akueus // Tidak mudah meruap <i>High melting and boiling point //</i> <i>Soluble in water but insoluble in organic solvent //</i> <i>Can conduct electricity in molten state and aqueous solution //</i> <i>Not easily volatile</i>	1
	(b)		P1. Nisbah mol/ <i>Mole ratio</i> P2. Jisim XY dengan unit yang betul/ <i>Mass of XY with correct unit</i> Contoh Jawapan/ <i>Sample answer:</i> P1. 2 mol X menghasilkan/ produce 2 mol XY // 0.1 mol X menghasilkan/ produce 0.1 mol XY P2. Jisim/Mass XY = $0.1 \times (24+16) = 4 \text{ g}$ Note: Apply ecf PI from 4(a)(iii)	1 1
			Jumlah <i>Total</i>	7

Soalan Question			Jawapan Answer	Markah Marks
5	(a)	(i)	Aluminium oksida // tanah liat // kaolin <i>Aluminium oxide // clay // kaolin</i>	1
		(ii)	Keras dan kukuh // Lengai terhadap bahan kimia // Ketahanan terhadap haba tinggi // Penebat haba <i>Hard and strong //Chemically inert //High thermal resistance // Heat insulator</i> [Mana-mana satu jawapan]	1
		(iii)	Seramik termaju // <i>Advanced ceramics</i>	1
		(iv)	Cakera brek // Cakera pemotong // Cincin tungsten karbida <i>Brake disc // Cutting disc // Tungsten carbide ring</i>	1

	(b)	(i)	Bahan pengukuhan <i>Strengthening substance</i>	1
		(ii)	P : Konkrit diperkukuhkan / <i>Reinforced concrete</i> Q : Argentum klorida atau argentum bromida / <i>silver chloride or silver bromide</i> R : Superkonduktor / <i>Superconductor</i>	3
			Jumlah <i>Total</i>	8

Soalan Question		Jawapan Answer	Markah Marks
6	(a)	$3\text{NaHCO}_3 + \text{C}_6\text{H}_8\text{O}_7 \rightarrow \text{Na}_3\text{C}_6\text{H}_5\text{O}_7 + 3\text{CO}_2 + 3\text{H}_2\text{O}$ P1 : correct balancing of reactants P2 : correct balancing of products	2
	(b)	P1: Bahan tindak balas = natrium bikarbonat dan asid sitrik P2: Produk = natrium sitrat, karbon dioksida, dan air P3: 3 mol NaHCO_3 bertindak balas dengan 1 mol $\text{C}_6\text{H}_8\text{O}_7$ menghasilkan 1 mol $\text{Na}_3\text{C}_6\text{H}_5\text{O}_7$, 3 mol CO_2 , dan 3 mol H_2O <i>P1 : Reactants = sodium bicarbonate and citric acid</i> <i>P2 : Products = sodium citrate, carbon dioxide and water</i> <i>P3 : 3 mol of NaHCO₃ reacts with 1 mol of C₆H₈O₇ producing 1 mol of Na₃C₆H₅O₇ , 3 mol of CO₂ and 3 mol of H₂O</i>	3
	(c)	1. Bil mol natrium bikarbonat = Jisim / JMR = $2.52/84 = 0.03 \text{ mol}$ 2. Nisbah mol 3 mol NaHCO_3 bertindak balas dengan 1 mol $\text{C}_6\text{H}_8\text{O}_7$ 0.03 mol NaHCO_3 bertindak balas dengan 0.01 mol $\text{C}_6\text{H}_8\text{O}_7$ 3. Jisim asid sitrik = mol x JMR = $0.01 \times 192 = 1.92 \text{ g}$ *Award 1 mark for RMM of $\text{Na}_3\text{C}_6\text{H}_5\text{O}_7$	1 1 1 1
		Jumlah <i>Total</i>	9

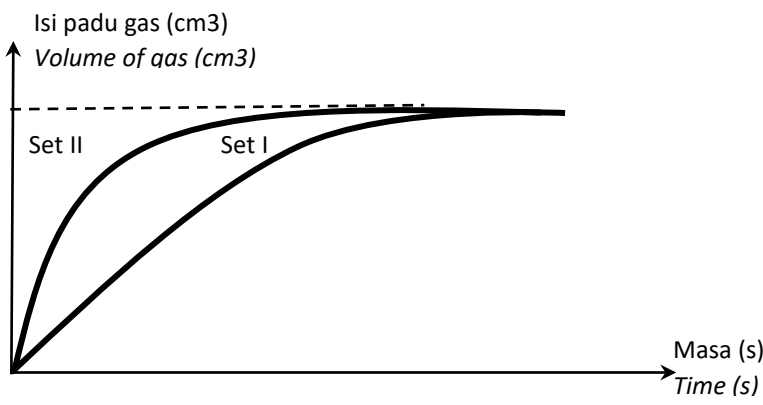
Soalan Question			Jawapan Answer	Markah Marks
7	(a)	(i)	Kakisan logam merupakan tindak balas redoks, iaitu logam dioksidakan secara spontan apabila atom logam membebaskan elektron membentuk ion logam // <i>Corrosion of metals is a redox reaction where the metals are spontaneously oxidised when metal atoms release electrons to form metal ions</i>	1
		(ii)	Logam P: Stanum//Plumbum//Kuprum Logam Q: Magnesium//Aluminium//Zink	2
		(iii)	Set I: Pengoksidaan / Oxidation : $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$	1
			Penurunan / Reduction $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 4\text{OH}^-$	1
			Set II: Pengoksidaan / Oxidation : $\text{Q} \rightarrow \text{Q}^{2+} + 2\text{e}^- // \text{Q} \rightarrow \text{Q}^{3+} + 3\text{e}^- // \text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^- // \text{Al} \rightarrow \text{Al}^{3+} + 3\text{e}^- // \text{Zn} \rightarrow \text{Zn}^{2+} + 2\text{e}^-$	1
			Penurunan / Reduction $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 4\text{OH}^-$	1
		(iv)	P	1
	(b)		Dawai pagar disalut dengan plastik / minyak / cat / sadur dengan zink The fence wire is coated with plastic / oil / paint / plated with zinc 1. dapat menghalang besi daripada terdedah kepada air dan oksigen // can prevent exposure of iron to water and oxygen [menerima mana-mana jawapan yang bersesuaian]	1 1
			Jumlah Total	10

Soalan Question			Jawapan Answer	Markah Marks				
8	(a)		Hidrokarbon B: but-2-ena <i>Hydrocarbon B: but-2-ene</i>	1				
	(b)	(i)	Molekul-molekul yang mempunyai formula molekul yang sama tetapi formula struktur yang berbeza. <i>Molecules that have the same molecular formula but different structural formulae.</i>	1				
		(ii)	H H - C - H H H H - C - C - C - H H H H	1				
	(c)	(i)	Heksena menghasilkan lebih banyak jelaga berbanding dengan heksana <i>Hexene produce more soot compare to hexane</i>	1				
		(ii)	<table><tr><td>Heksena <i>Hexene</i></td><td>Heksana <i>Hexane</i></td></tr><tr><td>%C = (12x6)/(12x6+1x12)X100% =85.71%</td><td>%C = (12x6)/(12x6+1x14)X100% =83.72%</td></tr></table>	Heksena <i>Hexene</i>	Heksana <i>Hexane</i>	%C = (12x6)/(12x6+1x12)X100% =85.71%	%C = (12x6)/(12x6+1x14)X100% =83.72%	1+1
Heksena <i>Hexene</i>	Heksana <i>Hexane</i>							
%C = (12x6)/(12x6+1x12)X100% =85.71%	%C = (12x6)/(12x6+1x14)X100% =83.72%							
			Peratus jisim karbon per molekul bagi heksena adalah lebih tinggi daripada heksana <i>Percentage of carbon by mass per molecule for hexene is higher than hexane</i>	1				
	(d)	(i)	Getah stirena butadiene (SBR)	1				
		(ii)	1. Getah asli <i>Natural rubber</i> // Lembut, selesa dipakai <i>Soft, comfortable to wear</i> // Rendah ketahanan haba, tapak kasut dapat mencengkap lantai lebih baik <i>Low heat resistance, sole can grip the flooring better</i> Atau / or 1. Getah sintetik <i>Synthetic rubber</i> // Lebih elastik, kasut boleh pakai lama <i>More elastic, shoe can wear longer</i> // Tinggi ketahanan haba, kasut tidak mudah haus <i>High heat resistant, the shoe sole is not easily worn</i>	2				
			Jumlah <i>Total</i>	10				

Bahagian B
Section B

Soalan Question			Jawapan Answer	Markah Marks
9	(a)		Haba penyesaran ialah perubahan haba apabila satu mol logam disesarkan daripada larutan garamnya oleh logam yang lebih elektropositif. <i>Heat of displacement is the heat change when one mole of a metal is displaced from its salt solution by a more electropositive metal.</i>	1
	(b)	i.	Biru <i>Blue</i> Warna menjadi pucat / kepekatan warna biru menurun <i>Colour becomes paler / the intensity of blue colour decreases</i>	1 1
		(ii)	Magnesium / Aluminium / Zink / Ferum / Tin / Plumbum <i>Magnesium / Aluminium / Zinc / Iron / Tin / Lead</i> $\text{X} + \text{CuSO}_4 \rightarrow \text{XSO}_4 + \text{Cu} //$ $\text{Mg} + \text{CuSO}_4 \rightarrow \text{MgSO}_4 + \text{Cu} //$ $\text{Zn} + \text{CuSO}_4 \rightarrow \text{ZnSO}_4 + \text{Cu} //$ mana-mana yang sesuai / <i>any suitable answer</i> 1. Bahan dan hasil betul / <i>correct reactants and product</i> 2. Seimbangkan persamaan / <i>balanced equation</i>	1 1
	(c)		Haba yang dibebaskan / <i>Heat released</i> = $mc\theta$ $= 100 \times 4.2 \times 7.5$ $= 3150 \text{ J}$	1
			Bilangan mol kuprum(II) sulfat / <i>Number of mole</i> = $\frac{MV}{1000}$ $= \frac{1.0 \times 100}{1000}$ $= 0.1 \text{ mol}$	1
			Haba penyesaran / <i>Heat of displacement</i> = $\frac{3150}{0.1}$ $= 31500 \text{ J}$ $= - 31.5 \text{ kJ mol}^{-1}$	1 + 1

	(d)	Tenaga Energy $X + \text{CuSO}_4$ $\Delta H = - 31.5 \text{ kJ mol}^{-1}$ $\text{XSO}_4 + \text{Cu}$ *Bentuk gambar rajah yang betul dan tenaga dituliskan *persamaan kimia dan ΔH yang betul	2 1
	(e)	i - Alkohol Y / <i>Y alcohol</i> - Nilai bahan api etanol / <i>Fuel value of ethanol</i> = $\frac{1380}{12 \times 2 + 5 + 16 + 1}$ = 30 kJ g^{-1} - Nilai bahan api propanol / <i>Fuel value of propanol</i> = $\frac{2020}{12 \times 3 + 7 + 16 + 1}$ = 33.67 kJ g^{-1} - Nilai bahan api alkohol Y / <i>Fuel value of Y alcohol</i> = $\frac{3332}{88}$ = 37.86 kJ g^{-1} ii - Sebab nilai bahan api alkohol Y tertinggi. <i>Because the fuel value of alcohol Y is the highest.</i> - Etanol <i>Ethanol</i> - Sebab gas karbon dioksida yang dihasilkan adalah paling rendah apabila satu mol etanol dibakar. <i>Because less carbon dioxide is produced when every 1 mole of ethanol is burnt.</i>	1 1 1 1 1 1 1 1
		JUMLAH / TOTAL	20

Soalan Question			Jawapan Answer	Markah Marks
10	(a)	(i)	Kadar tindak balas ialah isipadu gas hidrogen terbebas per unit masa <i>The volume of hydrogen gas released per unit time</i>	1
		(ii)	Kuprum (II) sulfat <i>Copper (II) sulphate</i>	1
			sebagai mangkin // mempercepatkan tindak balas// meningkatkan kadar tindak balas <i>act as catalyst// faster the reaction// increase the rate of reaction</i>	1
		(iii)	$\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$ Dapat menulis formula kimia yang betul dapat seimbangkan persamaan	2
	(b)	(i)	 - Melukis paksi X dan paksi Y dan label unit <i>Draw x axis and y axis with labelled unit</i> - Melukis dan melabel lengkung graf set I	1
				1

		ii • <i>More reactant particles/ Zn atom and H⁺ ion can achieve activation in Set II than Set I</i> • <i>Frequency of effective collisions between the particles is higher in Set II than Set I</i> <i>Set I dan set III</i> • Kadar tindak balas set III lebih tinggi berbanding kadar tindak balas set I. • Suhu HCl dalam Set III lebih tinggi dari Set I • Tenaga kinetik zarah dalam set III lebih tinggi dari set I • Frekuensi perlanggaran antara H⁺ ion dan atom Zn lebih tinggi di Set III dari Set I • Frekuensi perlanggaran berkesan antara zarah lebih tinggi di Set III dari set I <i>Set I dan set III</i> • <i>The rate of reaction in set III is higher than in set I.</i> • <i>The temperature of acid is higher in set III than Set I</i> • <i>The kinetic energy of particles in Set III is higher than Set I</i> • <i>The frequency of collisions between H⁺ ion and Zn atom is higher in Set III than Set I</i> • <i>Frequency of effective collisions between the particles is higher in Set III than Set I</i>	5
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Soalan Question	Jawapan Answer	Markah Marks
11 a) i)	pH merupakan suatu pengukuran logaritma ke atas kepekatan ion hidrogen yang terkandung di dalam suatu larutan akueus. <i>pH is a logarithmic measure of the concentration of hydrogen ions in an aqueous solution.</i>	1
a) ii)	Asid nitrik mengion lengkap dalam air... <i>Nitric acid ionise completely in water...</i>	1
	Asid etanoik mengion separa dalam air... <i>Ethanoic acid ionise partially in water...</i>	1
	...menghasilkan kepekatan ion hidrogen yang (lebih) tinggi... ...menghasilkan kepekatan ion hidrogen yang (lebih) rendah... <i>...produce high(er) concentration of hydrogen ion... ...produce low(er) concentration of hydrogen ion...</i> // Bikar A mengandungi kepekatan ion hidrogen yang lebih tinggi berbanding bikar B. <i>Beaker A contains higher concentration of hydrogen ion compared to beaker B.</i>	1
	Kepekatan ion hidrogen yang lebih tinggi menghasilkan nilai pH yang lebih rendah. <i>Higher concentration of hydrogen ion produces lower pH value.</i>	1
b) i)	Formula kimia bahan dan hasil tindak balas yang betul <i>Correct chemical formula for reactants and products</i>	1
	Persamaan kimia yang seimbang <i>Balanced chemical equation</i>	1
	Jawapan: $\text{H}_2\text{SO}_4 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$	
	Bilangan mol asid sulfurik <i>Number of mol of sulphuric acid</i>	
	Jawapan: Bil mol = $\frac{0.1 \times 10}{1000}$ // 0.0010 (mol)	1
	Bilangan mol larutan natrium hidroksida <i>Number of mol of sodium hydroxide solution</i>	
	Jawapan: Bil mol = $\frac{0.01 \times 80}{1000}$ // 0.0008 (mol)	1
	0.0010 mol H_2SO_4 bertindak balas dengan 0.0005 mol NaOH. <i>0.0010 mol H_2SO_4 reacts with 0.0005 mol NaOH.</i>	1
	NaOH adalah berlebihan. <i>NaOH is in excess.</i>	1

b) ii)	[Tindakan yang sesuai]	1
	[Pemerhatian yang sesuai dan inferens]	1
c)	Contoh jawapan: Masukkan sekeping kertas litmus merah ke dalam bikar tersebut, kertas litmus merah bertukar <u>menjadi biru</u> menunjukkan campuran dalam bikar adalah bersifat <u>alkali</u> <i>Insert a piece of red litmus paper into the beaker, red litmus paper <u>turns blue</u> indicating the mixture in the beaker is <u>alkaline</u>.</i>	1
	Bahan: kuprum(II) oksida / kuprum(II) karbonat <i>Substance: copper(II) oxide / copper(II) carbonate</i> <i>Reject: kuprum / copper</i>	1
	Langkah-langkah:	
	1. Tuangkan <u>[20-50] cm³ [1.0-2.0] mol dm⁻³</u> asid sulfurik ke dalam sebuah bikar. <u>Panaskan asid.</u>	1
	2. Tambahkan kuprum(II) oksida <u>sehingga terdapat serbuk yang tidak larut.</u>	1
	3. Kacaukan larutan.	1
	4. Turaskan larutan/ serbuk kuprum(II) oksida (yang berlebihan daripada campuran itu).	1
	5. Panaskan hasil turasan itu dalam <u>mangkuk penyejat</u> sehingga memperoleh <u>larutan garam yang tepu/ 1/3 isipadu larutan garam.</u>	1
	6. Biarkan larutan (tepu) menyejuk (untuk membentuk hablur garam).	1
	1. Pour <u>[20-50] cm³ of [1.0-2.0] mol dm⁻³</u> sulphuric acid, into a beaker. <u>Heat the acid.</u> 2. Add copper(II) oxide <u>until there is undissolved powder.</u> 3. Stir the solution. 4. Filter the solution/ (excess) copper(II) oxide (from the mixture). 5. Heat the filtrate in an <u>evaporating dish</u> until a <u>saturated salt solution / 1/3 volume of solution</u> is obtained. 6. Allow (saturated) solution to cool (to form salt crystals).	